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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/813,988	03/22/2001	Noriko Suehiro	205040US0	2664

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EXAMINER	
RUDE, TIMOTHY L	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/813,988	SUEHIRO ET AL.	
	Examin r	Art Unit	
	Timothy L Rude	2871	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *4,7,9,11-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,6,8 and 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claims

1. Claims 1 and 2 are amended.

Claim Objections

2. Claim 2 is objected to because of the following informalities: The equation for the value a, has incorrect units. Value a, is a distance measurement that cannot be expressed in terms of volts. For examination purposes, the denominator in said equation shall be interpreted as 10 volts. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 5, 6, 8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hattori et al (Hattori) USPAT 2002/0067451 A1 in view of Morokawa et al (Morokawa) USPAT 5,654,782 and further in view of West et al (West) USPAT 5,453,863.

As to claims 1 and 2, Hattori discloses in Figure 5, embodiment one (embodiment one is at para [0081] through [0084]), a liquid crystal display (LCD) element comprising a front side substrate, 33, having a front side electrode, 31, a rear side substrate, 36, having a rear side electrode, 34, and a liquid crystal layer, 37, interposed therebetween wherein the liquid crystal layer exhibits a plurality of display states; a display state is changed by a voltage applied across the electrodes, with the electrically off state being maintained stably, the liquid crystal display element being characterized in that at least a part of the front side electrode and the front side substrate is transparent [0081]; the front side electrode is divided into a plurality of electrode regions (per Figure 5) on its substrate surface, and the thickness d (μm) of the liquid crystal layer is 6 μm [0081].

Hattori teaches the use of a chiral nematic additive to the liquid crystal to facilitate quick and reliable transition from a splay alignment to a bend alignment state (Abstract, first para). Hattori also teaches in embodiment five (para [0095] through [0105]) the use of a liquid crystal material with a chiral additive [0095] (Applicant's chiral nematic liquid crystal layer) in an LCD similar to embodiment one [0096].

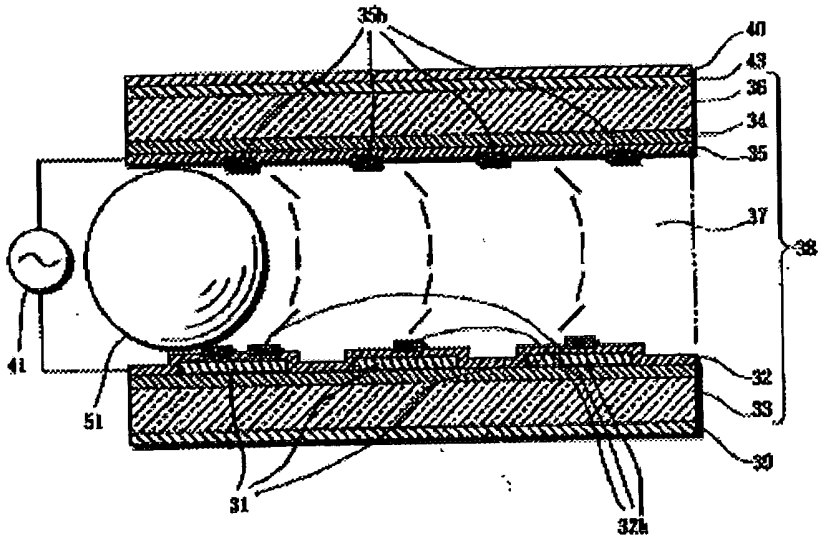

Fig. 5

Hattori does not explicitly disclose an element wherein the maximum space a (μm) between adjacent electrode regions and the thickness d (μm) of the liquid crystal layer satisfy a relational formula of $1.0 \cdot d \leq a \leq 4.0 \cdot d$.

Morokawa teaches the use of a pixel size of 100 to 200 μm to make the pixels non-distinct (better picture resolution, applicable and combinable with any type of liquid crystal matrix display, regardless of mode and liquid crystal material type) (col. 2, lines 24-28). Morokawa also teaches the use of gaps between adjacent pixels that are about 10% of the pixel dimension in order to obtain an aperture ratio of at least 80%. Those conditions result in $10\ \mu m \leq a \leq 20\ \mu m$.

Morokawa is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to combine use a pixel size of 100 to 200 μm to make the pixels non-distinct with the LCD of embodiment 5 of Hattori. This would result in $10\ \mu m \leq a \leq 20\ \mu m$ thereby satisfying $1.0 \cdot d \leq a \leq 4.0 \cdot d$, where $d = 6\ \mu m$, specifically $6\ \mu m \leq a \leq 24\ \mu m$.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Hattori with the small electrode size and spacing of Morokawa to produce a high-resolution display with non-distinct pixels.

Hattori does not explicitly disclose in embodiment one a chiral nematic liquid crystal used for the liquid crystal layer; the maximum space a (μm) between adjacent electrode regions, the thickness d (μm) of the liquid crystal layer, and the maximum effective voltage Vmax(V) of a voltage applied to the front side electrode and the rear side electrode satisfy a relational formula of $1.0 \cdot d \leq a \leq d \cdot Vmax/10$.

Hattori teaches the use of a chiral nematic additive to the liquid crystal to facilitate quick and reliable transition from a splay alignment to a bend alignment state (Abstract, first para). Hattori also teaches in embodiment five (para [0095] through [0105]) the use of a liquid crystal material with a chiral additive [0095] in an LCD similar to embodiment one [0096].

Hattori also teaches the use of 8 volts applied [0084].

Morokawa teaches the use of a pixel size of 100 to 200 μm to make the pixels non-distinct (better picture resolution) (col. 2, lines 24-28). Morokawa also teaches the use of gaps between adjacent pixels that are about 10% of the pixel dimension in order to obtain an aperture ratio of at least 80%. Those conditions result in $10\ \mu m \leq a \leq 20\ \mu m$.

Morokawa is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to combine use a pixel size of 100 to 200 μm to

make the pixels non-distinct with the LCD of Hattori. This would result in 10 μm $\leq$ a $\leq$ 20 μm thereby substantially satisfying $1.0 \cdot d \leq a \leq d \cdot Vmax/10$, where d = 6 μm, specifically 6 μm $\leq$ a $\leq$ 19.2 μm.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Hattori with the electrode size and spacing and chiral additive of Morokawa to produce a high-resolution display with non-distinct pixels and to facilitate quick and reliable transition (faster switching).

Hattori does not explicitly disclose a display comprising an amount of chiral dopant sufficient to provide reflection of visible light, and Hattori does not explicitly disclose that the liquid crystal layer in the interline portions remains in a focalconic state.

West teaches the use of a chiral dopant sufficient to provide reflection of visible light to achieve stable grey scale (col. 2, lines 10-23).

Applicants enabling disclosure (Specification, page 15, line 18, through page 18, line 8) provides the structural requirements to achieve a liquid crystal layer in the interline portions that remains in a focalconic state. Those structural requirements and driving voltages are met by the display of Hattori in view of Morokawa and further in view of West, above.

West is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a chiral dopant sufficient to provide reflection of visible light to achieve stable grey scale performance.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Hottori with the chiral dopant sufficient to provide reflection of visible light of West to achieve stable grey scale performance.

As to claim 3, Hattori discloses application of 8 V (Applicant's 48 V or less) [0084] and d = 6 μm (Applicant's 2.5 μm $\leq$ d $\leq$ 6.0 μm) [0081]. Also, the trend in the LCD industry is to move towards smaller dimensions of d.

As to claim 5, Hattori in view of Morokawa and further in view of West discloses a LCD display as described above.

Hattori does not explicitly disclose in embodiment one, a display wherein at least a part of the front side electrode is stripe-like electrodes and at least a part of the rear electrode is stripe-like electrodes, said stripe-like electrodes of the front side electrode and the rear side electrode being arranged so as to be crossed in the substrate plane.

However, conventional passive matrix LCDs commonly have at least a part of the front side electrode is stripe-like electrodes and at least a part of the rear electrode is stripe-like electrodes, said stripe-like electrodes of the front side electrode and the rear side electrode being arranged so as to be crossed in the substrate plane.

Hattori teaches that all embodiments can be made as passive matrix LCDs [0230].

Also, Morokawa discloses a passive matrix LCD wherein at least a part of the rear electrode is stripe-like electrodes, said stripe-like electrodes of the front side electrode and the rear side electrode being arranged so as to be crossed in the substrate plane in Figure 1(B).

Morokawa is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to combine a rear electrode wherein at least a part of the rear electrode is stripe-like electrodes, said stripe-like electrodes of the front side electrode and the rear side electrode being arranged so as to be crossed in the substrate plane to the passive LCD of Hattori to form a passive matrix display.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Hattori with the crossed stripe-like electrodes of Morokawa to form a passive matrix display.

As to claim 6, Hattori in view of Morokawa and further in view of West discloses a LCD display as described above.

Hattori does not explicitly disclose the claimed electrode line density.

Morokawa teaches the use of a pixel size if between 100 and 200 μm to achieve a high-resolution display with non-distinct pixels, as described in the rejection of claim 2, above. This results in a disposition density Ld (number/mm) of the stripe-like electrodes that is substantially $5 \leq Ld \leq 10$ (well within Applicant's $2 \leq Ld \leq 15$).

As to claim 8, Hattori teaches the use of a rear side electrode covered with a reflective metal film to form a reflective electrode for a reflective display [0229].

As to claim 10, Hattori teaches that all of his embodiments may be applied to passive matrix devices [0230]. This would result in a dot matrix display wherein figures and characters may be displayed.

Also, Morokawa teaches the use of a passive matrix device as described in the rejection of claim 5, above.

Response to Arguments

4. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L Rude whose telephone number is (703) 305-0418. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

Timothy L Rude
Examiner
Art Unit 2871

TLR
August 25, 2003

ROBERT H. KIM
SUPERVISORY PATENT EXAMINER
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